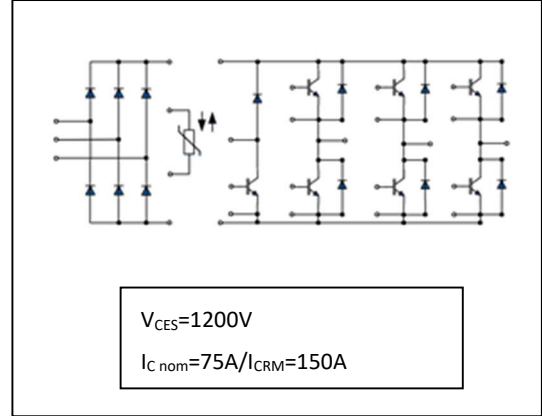


1200V 75A IGBT PIM Module

1200V 75A IGBT PIM 模块



Features:

- 1200V Trench+ Field Stop technology
- Freewheeling diodes with fast and soft reverse recovery
- $V_{CE(sat)}$ with positive temperature coefficient
- Low switching losses
- Short circuit ruggedness

Typical Applications:

- Motor drives
- Servo drives

产品特性:

- 1200V 沟槽栅+场截止技术
- 快速的软恢复特性续流二极管
- 导通压降具有正温度系数
- 低开关损耗
- 良好的短路稳定性

典型应用:

- 电机驱动
- 伺服驱动

IGBT, Inverter / IGBT, 逆变器

Maximum Rated Values / 最大额定值

Item	Symbol	Conditions	Value	Units
集电极-发射极电压 Collector-emitter voltage	V_{CES}	$T_{vj}=25^{\circ}\text{C}$	1200	V
连续集电极直流电流 Continuous DC collector current	I_c	$T_c=100^{\circ}\text{C}$	75	A
集电极重复峰值电流 Peak repetitive collector current	I_{CRM}	$t_p=1\text{ms}$	150	A
栅极-发射极峰值电压 Maximum gate-emitter voltage	V_{GES}		± 20	V
总功率损耗 Total power dissipation	P_{tot}	$T_c=25^{\circ}\text{C}, T_{vj}=175^{\circ}\text{C}$	380	W

Characteristic Values / 特征值

Item	Symbol	Conditions	Min.	Typ.	Max.	Units
集电极-发射极饱和电压 Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_c=75\text{A}, V_{GE}=15\text{V}$	$T_{vj}=25^{\circ}\text{C}$ $T_{vj}=125^{\circ}\text{C}$ $T_{vj}=150^{\circ}\text{C}$	1.72 2.04 2.12	2.10	V
栅极阈值电压 Gate threshold voltage	$V_{GE(th)}$	$I_c=2.4\text{mA}, V_{CE}=V_{GE}, T_{vj}=25^{\circ}\text{C}$	5.2	5.6	6.2	V
内部栅极电阻 Internal gate resistor	R_{Gint}	$T_{vj}=25^{\circ}\text{C}$		6.2		Ω
输入电容 Input capacitance	C_{ies}	$f=1\text{MHz}, T_{vj}=25^{\circ}\text{C}, V_{CE}=25\text{V}, V_{GE}=0\text{V}$		5.24		nF
反向传输电容 Reverse transfer capacitance	C_{res}	$f=1\text{MHz}, T_{vj}=25^{\circ}\text{C}, V_{CE}=25\text{V}, V_{GE}=0\text{V}$		0.24		nF
集电极-发射极截止电流 Collector-emitter cut-off current	I_{CES}	$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_{vj}=25^{\circ}\text{C}$			1.00	mA
栅极-发射极漏电流 Gate-emitter leakage current	I_{GES}	$V_{CE}=0\text{V}, V_{GE}=20\text{V}, T_{vj}=25^{\circ}\text{C}$			500	nA
开通延迟时间(电感负载) Turn-on delay time, inductive load	$t_{d(on)}$		$T_{vj}=25^{\circ}\text{C}$ $T_{vj}=125^{\circ}\text{C}$ $T_{vj}=150^{\circ}\text{C}$	85 95 96		ns
上升时间(电感负载) Rise time, inductive load	t_r		$T_{vj}=25^{\circ}\text{C}$ $T_{vj}=125^{\circ}\text{C}$ $T_{vj}=150^{\circ}\text{C}$	31 34 37		ns
关断延迟时间(电感负载) Turn-off delay time, inductive load	$t_{d(off)}$	$I_c=75\text{A}, V_{CE}=600\text{V}$ $V_{GE}=-15\text{V}\dots+15\text{V}$ $R_{Gon}=1\Omega$	$T_{vj}=25^{\circ}\text{C}$ $T_{vj}=125^{\circ}\text{C}$ $T_{vj}=150^{\circ}\text{C}$	256 309 323		ns
下降时间(电感负载) Fall time, inductive load	t_f	$R_{Goff}=1\Omega$ Inductive Load	$T_{vj}=25^{\circ}\text{C}$ $T_{vj}=125^{\circ}\text{C}$ $T_{vj}=150^{\circ}\text{C}$	186 178 167		ns
开通损耗能量(每脉冲) Turn-on energy loss per pulse	E_{on}		$T_{vj}=25^{\circ}\text{C}$ $T_{vj}=125^{\circ}\text{C}$ $T_{vj}=150^{\circ}\text{C}$	4.34 7.86 8.90		mJ
关断损耗能量(每脉冲) Turn-off energy loss per pulse	E_{off}		$T_{vj}=25^{\circ}\text{C}$ $T_{vj}=125^{\circ}\text{C}$ $T_{vj}=150^{\circ}\text{C}$	5.58 6.87 7.06		mJ
短路数据 SC data	I_{SC}	$V_{GE}=-15\text{V}\dots+15, V_{CC}=800\text{V}$ $V_{CEmax}=V_{CES}-L_{SCE}\cdot di/dt, t_p=10\mu\text{s}, T_{vj}=25^{\circ}\text{C}$		400		A
结-外壳热阻 Thermal resistance, junction to case	R_{thJC}	Per IGBT / 每个 IGBT			0.39	K/W
工作温度 Temperature under switching conditions	T_{vjop}		-40		150	$^{\circ}\text{C}$

Diode, Inverter / 二极管, 逆变器

Maximum Rated Values / 最大额定值

Item	Symbol	Conditions	Value	Units
反向重复峰值电压 Peak repetitive reverse voltage	V_{RRM}	$T_{vj}=25^{\circ}\text{C}$	1200	V
连续正向直流电流 Continuous DC forward current	I_F		60	A
正向重复峰值电流 Peak repetitive forward current	I_{FRM}	$t_p=1\text{ms}$	120	A

Characteristic Values / 特征值

Item	Symbol	Conditions	Min.	Typ.	Max.	Units
正向电压 Forward voltage	V_F	$I_F=60\text{A}$	$T_{vj}=25^{\circ}\text{C}$	2.12	2.50	V
			$T_{vj}=125^{\circ}\text{C}$	1.72		
			$T_{vj}=150^{\circ}\text{C}$	1.64		
反向恢复峰值电流 Peak reverse recovery current	I_{rm}	$I_F=60\text{A}$	$T_{vj}=25^{\circ}\text{C}$	64		A
			$T_{vj}=125^{\circ}\text{C}$	98		
			$T_{vj}=150^{\circ}\text{C}$	107		
反向恢复电荷 Reverse recovery charge	Q_{rr}	$-\text{di}_f/\text{dt}_{\text{off}}=1700\text{A}/\mu\text{s}$ $V_R = 600\text{V}$ $V_{GE}=-15\text{V}$	$T_{vj}=25^{\circ}\text{C}$	4.74		μC
			$T_{vj}=125^{\circ}\text{C}$	10.79		
			$T_{vj}=150^{\circ}\text{C}$	12.65		
反向恢复损耗 (每脉冲) Reverse recovery energy (per pulse)	E_{rec}		$T_{vj}=25^{\circ}\text{C}$	1.75		mJ
			$T_{vj}=125^{\circ}\text{C}$	3.87		
			$T_{vj}=150^{\circ}\text{C}$	4.86		
结-外壳热阻 Thermal resistance, junction to case	R_{thJC}	Per diode / 每个二极管			0.62	K/W
工作温度 Temperature under switching conditions	T_{vjop}		-40		150	$^{\circ}\text{C}$

IGBT, Brake Chopper / IGBT, 刹车

Maximum Rated Values / 最大额定值

Item	Symbol	Conditions	Value	Units
集电极-发射极电压 Collector-emitter voltage	V_{CEs}	$T_{vj}=25^{\circ}C, I_c=1mA, V_{GE}=0V$	1200	V
连续集电极直流电流 Continuous DC collector current	I_c	$T_c=100^{\circ}C, T_{vj}=175^{\circ}C$	50	A
集电极重复峰值电流 Peak repetitive collector current	I_{CRM}	$t_p=1ms$	100	A
栅极-发射极峰值电压 Maximum gate-emitter voltage	V_{GES}		± 20	V
总功率损耗 Total power dissipation	P_{tot}	$T_c=25^{\circ}C, T_{vj}=175^{\circ}C$	270	W

Characteristic Values / 特征值

Item	Symbol	Conditions	Min.	Typ.	Max.	Units
集电极-发射极饱和电压 Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_c=50A, V_{GE}=15V$		$T_{vj}=25^{\circ}C$ 2.02 $T_{vj}=125^{\circ}C$ 2.52 $T_{vj}=150^{\circ}C$ 2.68	2.40	V
栅极阈值电压 Gate threshold voltage	$V_{GE(th)}$	$I_c=1.6mA, V_{CE}=10V, T_{vj}=25^{\circ}C$	5.1	5.7	6.3	V
栅极电荷 Gate charge	Q_G	$V_{GE}=-15V...+15V$		0.23		μC
输入电容 Input capacitance	C_{ies}	$f=1MHz, T_{vj}=25^{\circ}C, V_{CE}=25V, V_{GE}=0V$		3.64		nF
反向传输电容 Reverse transfer capacitance	C_{res}	$f=1MHz, T_{vj}=25^{\circ}C, V_{CE}=25V, V_{GE}=0V$		0.13		nF
集电极-发射极截止电流 Collector-emitter cut-off current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V, T_{vj}=25^{\circ}C$			1.00	mA
栅极-发射极漏电流 Gate-emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$			100	nA
开通延迟时间(电感负载) Turn-on delay time, inductive load	$t_{d(on)}$			$T_{vj}=25^{\circ}C$ 119 $T_{vj}=125^{\circ}C$ 112 $T_{vj}=150^{\circ}C$ 111		ns
上升时间(电感负载) Rise time, inductive load	t_r			$T_{vj}=25^{\circ}C$ 38 $T_{vj}=125^{\circ}C$ 47 $T_{vj}=150^{\circ}C$ 49		ns
关断延迟时间(电感负载) Turn-off delay time, inductive load	$t_{d(off)}$	$I_c=50A, V_{CE}=600V$ $V_{GE}=-15V...+15V$ $R_{Gon}=40\Omega$		$T_{vj}=25^{\circ}C$ 319 $T_{vj}=125^{\circ}C$ 358 $T_{vj}=150^{\circ}C$ 368		ns
下降时间(电感负载) Fall time, inductive load	t_f	$R_{Goff}=40\Omega$ Inductive Load		$T_{vj}=25^{\circ}C$ 176 $T_{vj}=125^{\circ}C$ 257 $T_{vj}=150^{\circ}C$ 237		ns
开通损耗能量(每脉冲) Turn-on energy loss per pulse	E_{on}			$T_{vj}=25^{\circ}C$ 4.00 $T_{vj}=125^{\circ}C$ 7.00 $T_{vj}=150^{\circ}C$ 7.89		mJ
关断损耗能量(每脉冲) Turn-off energy loss per pulse	E_{off}			$T_{vj}=25^{\circ}C$ 3.13 $T_{vj}=125^{\circ}C$ 4.26 $T_{vj}=150^{\circ}C$ 4.68		mJ
短路数据 SC data	I_{sc}	$V_{GE}=-15V...+15, V_{CC}=800V$ $V_{CEmax}=V_{CES}-L_{sCE} \cdot di/dt, t_p=10\mu s, T_{vj}=25^{\circ}C$		155		A
结-外壳热阻 Thermal resistance, junction to case	$R_{th(jc)}$	Per IGBT / 每个 IGBT			0.54	K/W
工作温度 Temperature under switching conditions	T_{vjop}		-40		150	$^{\circ}C$

Diode, Brake Chopper / 二极管, 刹车

Maximum Rated Values / 最大额定值

Item	Symbol	Conditions	Value	Units
反向重复峰值电压 Peak repetitive reverse voltage	V_{RRM}	$T_{vj}=25^{\circ}\text{C}$	1200	V
连续正向直流电流 Continuous DC forward current	I_F		30	A
正向重复峰值电流 Peak repetitive forward current	I_{FRM}	$t_p=1\text{ms}$	60	A

Characteristic Values / 特征值

Item	Symbol	Conditions	Min.	Typ.	Max.	Units
正向电压 Forward voltage	V_F	$I_F=50\text{A}$	$T_{vj}=25^{\circ}\text{C}$	2.10	2.40	V
			$T_{vj}=125^{\circ}\text{C}$	1.71		
			$T_{vj}=150^{\circ}\text{C}$	1.62		
反向恢复峰值电流 Peak reverse recovery current	I_{rr}	$I_F=50\text{A}$	$T_{vj}=25^{\circ}\text{C}$	28		A
			$T_{vj}=125^{\circ}\text{C}$	35		
			$T_{vj}=150^{\circ}\text{C}$	36		
反向恢复电荷 Reverse recovery charge	Q_r	$-di_r/dt_{off}=710\text{A}/\mu\text{s}$ $V_R = 600\text{V}$ $V_{GE}=-15\text{V}$	$T_{vj}=25^{\circ}\text{C}$	1.68		μC
			$T_{vj}=125^{\circ}\text{C}$	4.85		
			$T_{vj}=150^{\circ}\text{C}$	5.79		
反向恢复损耗 (每脉冲) Reverse recovery energy (per pulse)	E_{rec}		$T_{vj}=25^{\circ}\text{C}$	0.47		mJ
			$T_{vj}=125^{\circ}\text{C}$	1.45		
			$T_{vj}=150^{\circ}\text{C}$	1.75		
结-外壳热阻 Thermal resistance, junction to case	R_{thJC}	Per diode / 每个二极管			1.35	K/W
工作温度 Temperature under switching conditions	T_{vjop}		-40		150	$^{\circ}\text{C}$

Diode, Rectifier / 二极管, 整流

Maximum Rated Values / 最大额定值

Item	Symbol	Conditions	Value	Units
反向重复峰值电压 Peak repetitive reverse voltage	V_{RRM}	$T_{vj}=25^{\circ}\text{C}$	1800	V
最大正向均方根电流(每芯片) Maximum RMS forward current per chip	I_{FRMSM}	$T_c = 80^{\circ}\text{C}$	70	A
最大整流器输出均方根电流 Maximum RMS current at rectifier output	I_{RMSM}	$T_c = 80^{\circ}\text{C}$	130	A
正向浪涌电流 Surge forward current	I_{FSM}	$t_p=10\text{ms}, T_{vj}=25^{\circ}\text{C}, \sin 180^{\circ}$	840	A
I^2t -值 I^2t -value	I^2t	$t_p=10\text{ms}, T_{vj}=25^{\circ}\text{C}, \sin 180^{\circ}$	3528	A^2s

Characteristic Values / 特征值

Item	Symbol	Conditions	Min.	Typ.	Max.	Units
正向电压 Forward voltage	V_F	$T_{vj}=25^{\circ}\text{C}, I_F=60\text{A}$		2.12	2.50	V
反向电流 Reverse current	I_R	$T_{vj}=125^{\circ}\text{C}, V_R=1800\text{V}$			2.0	mA
工作温度 Temperature under switching conditions	T_{vjop}		-40		150	$^{\circ}\text{C}$

NTC-Thermistor / 负温度系数热敏电阻

Characteristic Values / 特征值

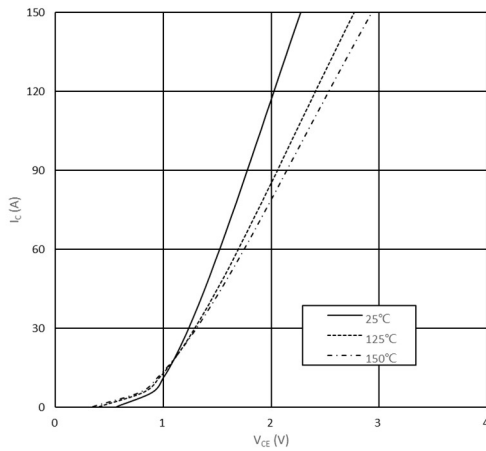
Item	Symbol	Conditions	Value	Units
额定电阻值 Rated resistance	R_{25}	$T_c=25^{\circ}\text{C}$	5.00	$\text{k}\Omega$
B-值 B-value	$B_{25/50}$	$R_2=R_{25} \exp[B_{25/50}(1/T_2-1/(298.15\text{K}))]$	3375	K

Module / 模块

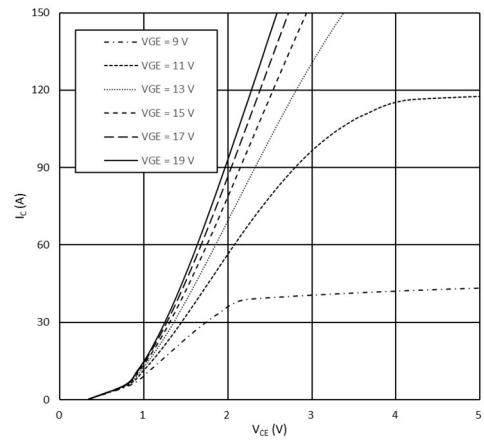
Item	Symbol	Conditions	Value	Units
绝缘测试电压 Isolation test voltage	V_{ISOL}	RMS, f=50Hz, t=1min	2.5	kV
模块基板材料 Material of module baseplate			Cu	
内部绝缘 Internal isolation		基本绝缘 (class 1, IEC 61140) Basic insulation (class 1, IEC 61140)	Al_2O_3	
爬电距离 Creepage distance			10	mm
电气间隙 Clearance			7.5	mm
相对电痕指数 Comperative tracking index	CTI		> 200	

Item	Symbol	Conditions	Min.	Typ.	Max.	Units
杂散电感, 模块 Stray inductance module	L_{SCE}			25		nH
模块引脚电阻, 端子-芯片 Module Lead Resistance, Terminals-Chip	$R_{CC^+EE^+}$	$T_H=25^{\circ}C$, 每个开关/perswitch		1.1		m Ω
储存温度 Storage temperature	T_{stg}		-40		125	$^{\circ}C$
模块安装的安装扭距 Mounting torque for module mounting	M		3.00		6.00	Nm
重量 Weight	G			300		g

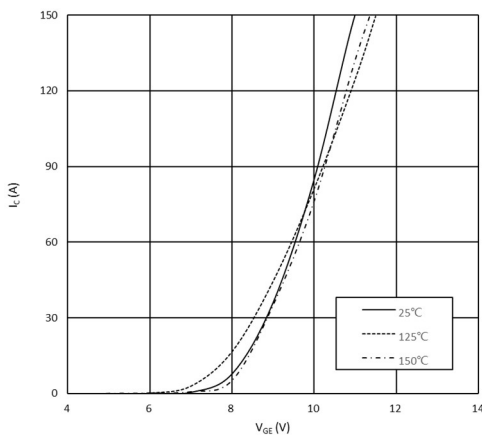
输出特性 IGBT, 逆变器 (典型)
Output characteristic IGBT, Inverter (typical)
 $I_C = f(V_{CE})$



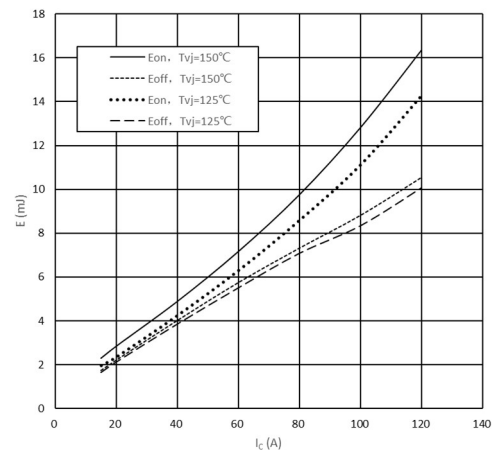
输出特性 IGBT, 逆变器 (典型)
Output characteristic IGBT, Inverter (typical)
 $I_C = f(V_{CE})$
 $T_{vj} = 150^\circ\text{C}$



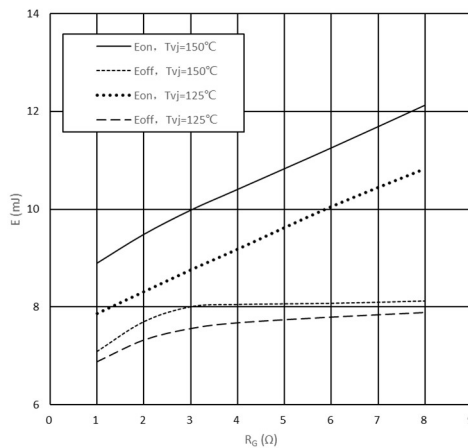
转移特性 IGBT, 逆变器 (典型)
Transfer characteristic IGBT, Inverter (typical)
 $I_C = f(V_{GE})$
 $V_{CE} = 20\text{V}$



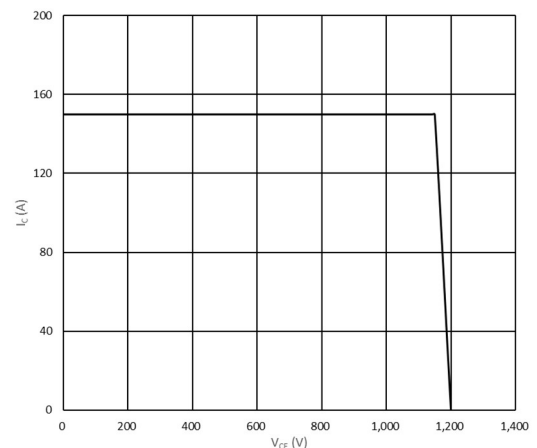
开关损耗 IGBT, 逆变器 (典型)
Switching losses IGBT, Inverter (typical)
 $E = f(I_C)$
 $V_{GE} = \pm 15\text{V}, R_G = 1\ \Omega, V_{CE} = 600\text{V}$



开关损耗 IGBT, 逆变器 (典型)
Switching losses IGBT, Inverter (typical)
 $E = f(R_G)$
 $V_{GE} = \pm 15\text{V}, I_C = 75\text{A}, V_{CE} = 600\text{V}$



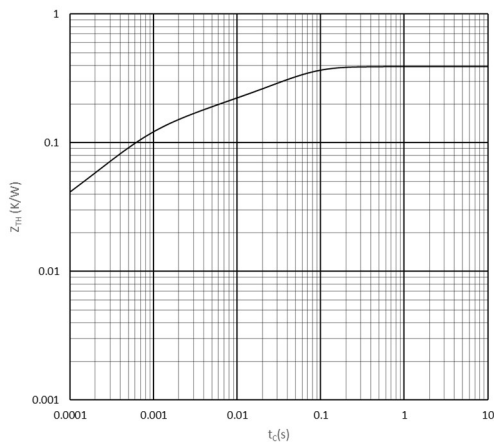
反偏安全工作区 IGBT, 逆变器 (RBSOA)
Reverse bias safe operating area IGBT, Inverter (RBSOA)
 $I_C = f(V_{CE})$
 $V_{GE} = \pm 15\text{V}, R_{Goff} = 1\ \Omega, T_{vj} = 150^\circ\text{C}$



瞬态热阻抗 IGBT, 逆变器

Transient thermal impedance IGBT, Inverter

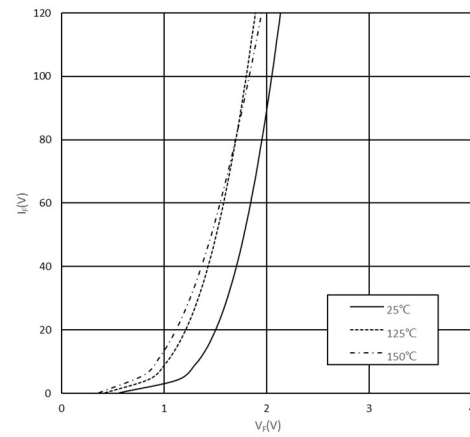
$Z_{thJC}=f(t)$



正向偏压特性 FRD, 逆变器 (典型)

Forward characteristic of FRD, Inverter (typical)

$I_F=f(V_F)$

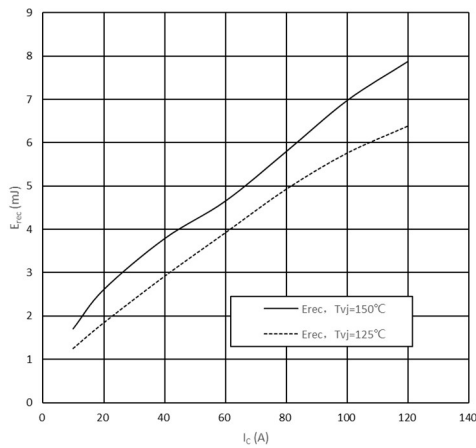


开关损耗 FRD, 逆变器 (典型)

Switching losses FRD, Inverter (typical)

$E=f(I_F)$

$R_G=1\ \Omega, V_{CE}=600V$

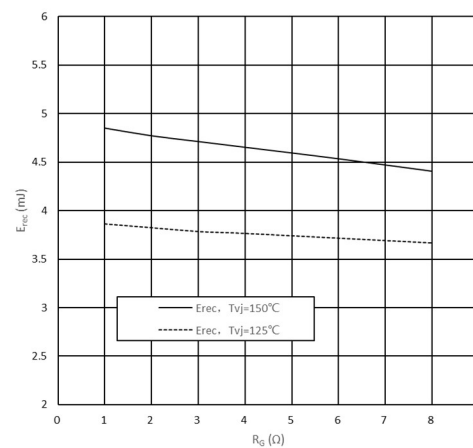


开关损耗 FRD, 逆变器 (典型)

Switching losses FRD, Inverter (typical)

$E=f(R_G)$

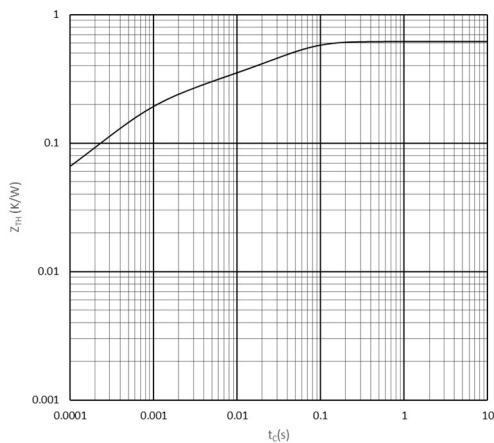
$I_F=75A, V_{CE}=600V$



瞬态热阻抗 FRD, 逆变器

Transient thermal impedance FRD, Inverter

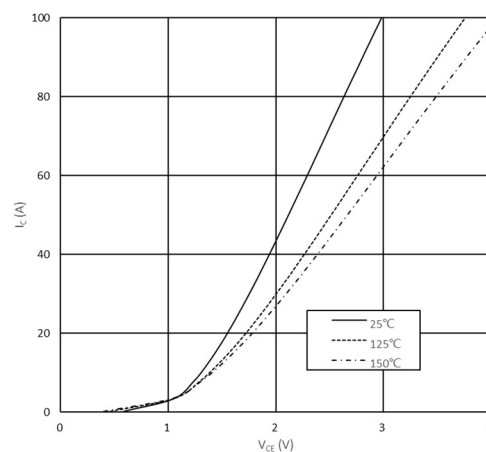
$Z_{thJC}=f(t)$



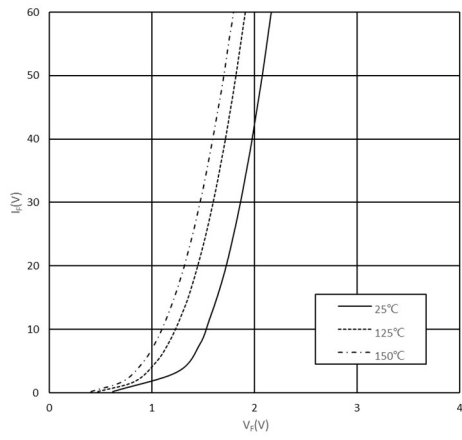
输出特性 IGBT, 刹车 (典型)

Output characteristic IGBT, Brake Chopper (typical)

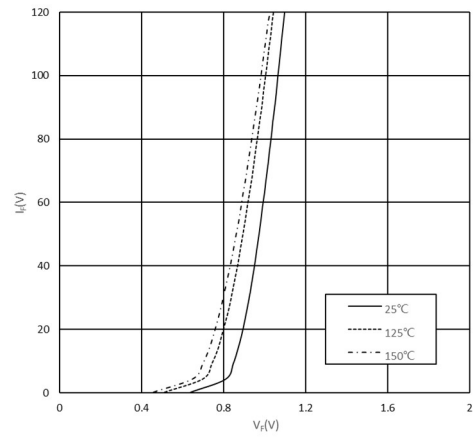
$I_C=f(V_{CE})$



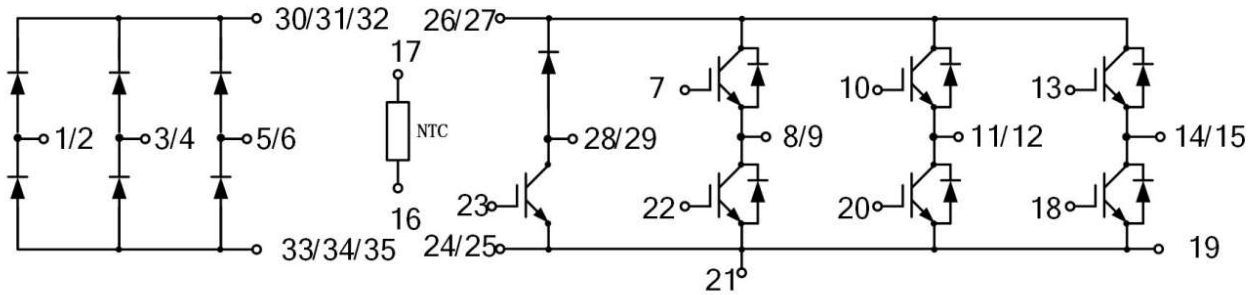
正向偏压特性 FRD, 刹车 (典型)
Forward characteristic of FRD, Brake Chopper (typical)
 $I_F=f(V_F)$



正向偏压特性 Diode, 整流 (典型)
Forward characteristic of Diode, Rectifier (typical)
 $I_F=f(V_F)$



Circuit diagram headline / 接线图



Package outlines / 封装尺寸

